Presidency compromise proposal on the Framework Programme

3. Secure, clean and efficient energy

3.1. Specific objective

The specific objective is to make the transition to a reliable, affordable, publicly accepted, sustainable and competitive energy system, aiming at reducing fossil fuel dependency in the face of increasingly scarce resources, increasing energy needs and climate change.

The Union intends to reduce greenhouse gas emissions by 20 % below 1990 levels by 2020, with a further reduction to 80-95 % by 2050. In addition, renewables should cover 20 % of final energy consumption in 2020 coupled with a 20 % energy efficiency target.

Achieving these objectives will require an overhaul of the energy system combining low carbon profile **and the development of alternatives to fossil fuels,** energy security and affordability, while at the same time reinforcing Europe's economic competitiveness. Europe is currently far from this overall goal. 80 % of the European energy system still relies on fossil fuels, and the sector produces 80 % of all the Union's greenhouse gas emissions.

Every year 2.5 % of the Union's Gross Domestic Product (GDP) is spent on energy imports and this is likely to increase. This trend would lead to total dependence on oil and gas imports by 2050. Faced with volatile energy prices on the world market, coupled with concerns over security of supply, European industries and consumers are spending an increasing share of their income on energy. **European cities are responsible for 70-80%[11] of the total energy consumption in the EU and for about the same share of green house gas emissions.**

The roadmap to a competitive low-carbon economy in 2050[12] **suggests** that the targeted reductions in greenhouse gas emissions will have to be met largely within the territory of the Union. This would entail reducing CO_2 emissions by over 90 % by 2050 in the power sector, by over 80 % in industry, by at least 60 % in transport and by about 90 % in the residential sector and services. **The roadmap also shows that inter-alia natural gas, in the short to medium term, can contribute to the transformation of the energy system, combined with the use of CCS technology.**

To achieve these **ambitious** reductions, significant investments need to be made in research, development, demonstration and market roll-out **at affordable prices** of efficient, safe, **secure** and reliable low-carbon energy technologies**, including gas,** and services. These must go hand in hand with non-technological solutions on both the supply and demand sides **by initiating participation processes and integrating consumers**. All this must be part of an integrated **sustainable** low-carbon policy, including mastering key enabling technologies, in particular ICT solutions and advanced manufacturing, processing and materials. The goal is to **develop and** produce efficient energy technologies and services **including the integration of renewable energy**, that can be taken up widely on European and international markets and to establish intelligent demand-side management based on an open and transparent energy trade market and **secure** intelligent energy efficiency management systems.

3.2. Rationale and Union added value

New technologies and solutions must compete on cost and reliability against highly optimised energy systems with well-established incumbents and technologies. Research and innovation are critical to make these new, cleaner, low-carbon, more efficient energy sources commercially attractive on the scale needed, **including renewable**. Neither industry alone, nor Member States

individually, are able to bear the costs and risks, for which the main drivers (transition to a low carbon economy, providing affordable and secure energy) are outside the market.
Speeding up this development will require a strategic approach at Union level, spanning energy supply, demand and use in buildings, services, **domestic use,** transport and industrial value chains. This will entail aligning resources across the Union, including cohesion policy funds, in particular through the national and regional strategies for smart specialisation, emission trading schemes (ETS), public procurement and other financing mechanisms. It will also require regulatory and deployment policies for renewables and energy efficiency, tailored technical assistance and capacity-building to remove non-technological barriers.
The Strategic Energy Technology Plan (SET Plan) offers such a strategic approach. It provides a long term agenda to address the key innovation bottlenecks that energy technologies are facing at the frontier research and R&D/proof-of-concept stages and at the demonstration stage when companies seek capital to finance large, first-of-a-kind projects and to open the market deployment process. **Newly emerging technologies with disruptive potential will not be neglected.**
The resources required to implement the SET Plan in full have been estimated at EUR 8 billion per year over the next 10 years[13]. This is well beyond the capacity of individual Member States or research and industrial stakeholders alone. Investments in research and innovation at Union level are needed, combined with mobilisation of efforts across Europe in the form of joint implementation and risk and capacity sharing. Union funding of energy research and innovation shall therefore complement Member States' activities by focusing on **cutting-edge technologies and** activities with clear Union added value, in particular those with high potential to leverage national resources **and create jobs in Europe**. Action at Union level shall also support high-risk, high-cost, long-term programmes beyond the reach of individual Member States, pool efforts to reduce investment risks in large-scale activities such as industrial demonstration and develop Europe-wide, interoperable energy solutions.
Implementation of the SET-Plan as the research and innovation pillar of European energy policy will reinforce the Union's security of supply and the transition to a low-carbon economy, help to link research and innovation programmes with trans-European and regional investments in energy infrastructure and increase the willingness of investors to release capital for projects with long lead-times and significant technology and market risks. It will create opportunities for innovation for small and large companies and help them become or remain competitive at world level, where opportunities for energy technologies are large and increasing.
On the international scene, the action taken at Union level provides a 'critical mass' to attract interest from other technology leaders and foster international partnerships to achieve the Union's objectives. It will make it easier for international partners to interact with the Union to build common action where there is mutual benefit and interest.
The activities under this challenge will therefore form the technological backbone of European energy and climate policy. They will also contribute to achieving the Innovation Union in the field of energy and the policy goals outlined in 'Resource Efficient Europe', 'An Industrial Policy for the Globalisation Era' and 'A Digital Agenda for Europe'.
Research and innovation activities on nuclear fission and fusion energy are carried out in the EURATOM part of Horizon 2020**, but coordination with the energy challenge should be sought in order to foster synergies between both programmes**.

3.3 Broad lines of the activities
(a) Reducing energy consumption and carbon footprint by smart and sustainable use

Activities shall focus on research and full-scale testing of new concepts, non-technological solutions, more efficient, socially acceptable and affordable technology components and systems with in-built intelligence, to allow real-time energy management for **new and existing near-zero-emission,** near-zero-**energy and positive energy** buildings, **retrofitted buildings, cities and districts,** renewable heating and cooling, highly efficient industries and mass take-up of energy efficiency **and energy saving** solutions **and services** by companies, individuals, communities and cities.

(b) Low-cost, low-carbon electricity supply
Activities shall focus on research, development and full scale demonstration **-** of innovative renewables**, efficient** and **flexible fossil power plants (including those using natural gas) and** carbon capture and storage**, or CO_2 re-use** technologies**,** offering larger scale, lower cost, environmentally safe technologies with higher conversion efficiency and higher availability for different market and operating environments.

(c) Alternative fuels and mobile energy sources Activities shall focus on research, development and full scale demonstration of technologies and value chains to make bio-energy more competitive and sustainable, **for power and heat, surface, maritime and air transport,** to reduce time to market for hydrogen and fuel cells and to bring new options showing long-term potential to maturity.

(d) A single, smart European electricity grid Activities shall focus on research, development and full scale demonstration of new **smart energy** grid technologies, including **flexible energy** storage, systems and market designs to plan, monitor, control and safely operate interoperable networks**, including standardisation issues,** in an open, decarbonised, **environmentally sustainable** climate resilient and competitive market, under normal and emergency conditions.

(e) New knowledge and technologies Activities shall focus on multi-disciplinary research for **clean, safe and sustainable** energy technologies (including visionary actions) and joint implementation of pan-European research programmes and world-class facilities.

(f) Robust decision making and public engagement Activities shall focus on the development of tools, methods**,** ~~and~~ models **and forward-looking and perspective scenarios** for a robust and transparent policy support, including activities on public, user involvement**, environmental impact** and sustainability **assessment improving the understanding of energy related socio-economic trends and prospects**.

(g) Market uptake of energy innovation Activities shall focus on applied innovation **and promotion of standards** to facilitate the market uptake of energy technologies and services, to address non-technological barriers and to accelerate the cost effective implementation of the Union's energy policies. **Technological innovation will be accompanied by initiatives that support non-technological innovation. Attention will also be given to innovation for the smart and sustainable use of existing technologies. In the field of market uptake activities should also build on the experience of the Intelligent Energy Europe (IEE) initiative.**